DOCUMENT RESUME

ED 293 614 JC 880 231

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TITLE The Feasibility of Using a Portable InstaCap System in a College Environment.
INSTITUTION Canadian Captioning Development Agency, Toronto (Ontario).
PUB DATE Jan 88
NOTE 26p.
PUB TYPE Reports - Evaluative/Feasibility (142) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Communication Aids (for Disabled); Community Colleges; Computer Oriented Programs; Feasibility Studies; Foreign Countries; *Hearing Impairments; Mainstreaming; *Notetaking; Program Costs; *Student Attitudes; Student Reaction; *Teacher Attitudes; Two Year Colleges; Two Year College Students
IDENTIFIERS *Captioned Media; *InstaCap System

ABSTRACT

A study was conducted to investigate the feasibility of using a portable electronic note-taking/captioning system (InstaCap) by a deaf student in a college classroom. The study investigated the extent to which the deaf student was assisted by the system, the extent to which other students and the teacher were distracted, and costs to the college. The InstaCap system was used by a deaf student attending a college of applied arts and technology in Ontario for the following classes: Media Studies, Public Policy, Psychology, Applied Human Relations, Communications, and Culture and Values. A typist, using a microcomputer and specially designed software, keyed in class notes. From the notes, captions were generated and displayed using a wireless video transmitter and television monitor. The feasibility study showed that: (1) 92% of the 39 hearing students in the psychology class indicated that neither the typist nor the monitor was a distraction for them in the lecture hall, though three students found the monitor to be somewhat distracting in small classrooms; (2) although most faculty members did not find the presence of the InstaCap system to be distracting, problems were noted when the system had to be set up during class and when the deaf students' responses to class discussions were delayed while waiting for the class dialogue to appear on the screen; (3) while the deaf student rated the usefulness of the InstaCap system highly, he indicated that he and the other students had expected too much all at once and that his social interaction with other students was restricted; and (4) most students and faculty members felt that the presence of the InstaCap system had positively influenced their awareness of the difficulties encountered by hearing impaired students in the classroom. The study report includes a discussion of the development of the InstaCap system, information on costs, and a list of the system's strengths and weaknesses. (EJV)

ED293614

# THE FEASIBILITY OF USING A PORTABLE INSTACAP SYSTEM IN A COLLEGE ENVIRONMENT

by
Dr. Ena Hobelaid

A research project for the
Canadian Captioning Development Agency (CCDA)
Toronto, Ontario, Canada

January 1988

JC 880 231

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## Introduction

The purpose of this study is to investigate the feasibility of using a portable electronic note-taking/captioning system by a deaf student in the college classroom. Captioning allows the hearing impaired to follow what is being said by watching text on a screen. It is accomplished through the encoding of this text information on line 21 of the vertical blanking interval of the broadcast signal and viewed with the aid of a decoding device. Though captioning has been available for use in meetings, seminars, and conferences, it has not been used in the college environment as a tool to aid teaching and learning. The issue of feasibility will be looked at through the aspects of: 1) the ramification of the system in the classroom, 2) the system's influence on the participants in the study, 3) the question of accessibility to the information provided by the system, and 4) the investment of time and money in such systems for classroom use.

In accordance with the Canadian Charter of Rights and Freedoms (Section 15), the Ontario Human Rights Code (Section 1 and Section 9), and Bill 82 (The Education Amendment Act, 1980), students with special needs can expect accommodations to be made by educational institutions so that they can pursue post-secondary education. While Bill 82 does not pertain to post-secondary education, it does, however, establish the expectation with the special needs population that services will be available to allow them the opportunity to continue their education (Smith, 1985).

One such group is the deaf/hearing impaired student. According to Greene, there are no current statistics on the total number of hearing impaired students in higher education. In the United States, Gallaudet University estimated in 1985 that 7,000 undergraduate and graduate students were enrolled in programs for the hearing impaired. In addition to that number there are also some students who are not enrolled in special programs (Greene, 1987).

According to the Faculty Guide (Trent University, 1983), the major challenge facing the hearing impaired student is communication. Their ability to develop many of the concepts of speech and language through casual listening is impaired. At best, a hearing impaired person can lip read only 30 to 40 percent of the sounds of spoken English by watching the speaker's lips. The main form of communication within the deaf community is sign language which does not follow English grammar rules. In view of this, many hearing impaired persons have not mastered the grammatical subtleties of their "second language" - English. This difficulty with English is not related to intelligence but is similar to that experienced by students whose native language is other than English. When an interpreter is used, there is a time lag, which will vary in length depending on the situation, between the spoken word and the interpretation or translation. Thus a hard of hearing student's contribution to the lecture or discussion may be slightly delayed.

One factor which can make it possible for deaf/hearing impaired students to participate more fully in the educational

realm is the development of computer and software technology. An example of such a development is InstaCap which uses captioning to display text.

## Development of InstaCap

The Canadian Captioning Development Agency Inc. (CCDA) which developed InstaCap was founded on December 1, 1981 at the request of Francis Fox, Minister of Communications, as a private non-profit agency to provide captioning services for the benefit of the 2.5 million hearing impaired people in Canada. It was the first supplier of closed captioning in the world (Potter, 1987). The company has worked with broadcasters, advertisers, independent producers, and educational networks to provide captions for the hearing impaired in English and French. Closed captioning has also proven to be of benefit to the hearing by: adults learning a second language, children learning to read, and those working in areas with high noise levels.

InstaCap was developed to satisfy the needs of the hearing impaired at meetings where other means of communication (sign language, IR or FM transmission, etc.) were either not available to all participants or were too expensive for the meeting organizers (Canadian Captioning Development Agency 1987). On October 18, 1986, the CCDA revealed its InstaCap package. The package consisted of:

* an IBM/PC (or compatible) computer with 512K bytes of memory, a floppy disk drive, a serial interface card, a monochrome CRT, and a keyboard;

* a television monitor; a hardware caption generator (plus cabling);

* a VCR for a video source;

* the software; and

* a printer (plus cabling).

Notes typed by the typist on the computer which used specially designed software, were "captioned" by the captioning generator and sent as a T.V. signal throughout the room and picked up on a video/TV monitor. The computer CRT displayed 15 lines of text and a 1 line area for text entry. As text was entered by the typist, it was shown in the one line area. After 32 characters were entered in the area or if the <Enter> key was depressed, the text was transmitted to the caption generator to be displayed on the video/TV monitor. Additional lines of text entered at the bottom of the screen while the top lines moved off the screen. At the conclusion of the meeting, a printed transcript of the proceedings was made available. The system was orginally designed as a permanent unit to be placed in lecture halls and to be used by the hearing impaired so that they could participate in discussions. Some of its features included the:

* use of computer hardware that was readily available and did not require modifications for its use;

* display of captions on either a video monitor or standard television set;

* display by the computer and television of the same information;

* use of single keystrokes to invoke system functions, to provide on-line "help", and to include one or more files in the text;

* use of NCI's new TeleCaption II character set which includes italics, underline, and flash;

* use of a dictionary which holds 26 macro phrases;

* ability to create and save text files;

* ability to scroll backwards through the text; and

* ability to print transcripts of text at any time.

In the fall of 1987 several staff members of the School of Technology at one of the Applied Arts and Technology colleges in Ontario developed what was believed to be the first truly portable model related to the original system. The microcomputer, monitor, caption generator, and a wireless video transmitter (which replaced the VCR) were installed on a custom re-designed metal computer desk and mounted on wheels. A 12-inch television monitor and the printer were permanently installed on a metal AV table with wheels. The student was able to view the captioned note-taking from the typist within a 300 foot range of the transmitter. The video transmitter made the system totally portable and somewhat independent whereas the student with the monitor and the typist with the computer could be separate from each other with "no wires" attached.

The project was undertaken with little direct cost to the college. The caption generator and the InstaCap software were loaned by CCDA. The video transmitter, the tables, and the typist's salary were paid by Vocational Rehabilitation Services, a department of the Ministry of Community and Social Services. The television set was supplied by the Peterborough branch of the Canadian Hearing Society. The microcomputer and printer were loaned by the Nursing department of the college. The video card was donated by the School of Technology. The practical matter of installing the equipment and making it "workable" was

undertaken by two faculty members of the college who donated their time and technical expertise.

An accounting of the project reflected these costs:

| | |
|---|---|
| InstaCap software - | $ 300.00 |
| caption generator - | $2,000.00 |
| IBM PC/XT with printer - | $2,000.00 |
| video transmitter - | $ 50.00 |
| microcomputer table - | $ 423.00 |
| AV table - | $ 150.00 |
| video card - | $ 80.00 |
| televison set - | $ 100.00 |
| TOTAL - | $5,1030.00 |

This does not include the cost of the typist which was $10.00 per hour or the cost in assembling the unit.

## Methodology

The sample for the study was comprised of the classmates of the deaf student, the teaching faculty for that student, the student himself, the typist, and the regional director of the Canadian Hearing Society (Peterborough). An explanation that participation was voluntary and the purpose of the research was given to each cohort. The classmates were given a questionnaire in their psychology class while the teaching faculty, the deaf student, the typist, and the regional director of the Canadian Hearing Society were interviewed to obtain the data for the study.

The psychology class was comprised of 31 General Arts and Science (GAS) students of whom 21 were women and 10 were men and 60 Nursing students of whom 58 were women and 2 were men for a class total of 91 students. At time of the survey, 42 students attended class of which 39 (43%) completed the survey and 3 had not. Four of the five faculty that taught the deaf student in the General Arts and Science program were available to be interviewed and taught the following courses: Media Studies, Public Policy, Psychology I, Applied Human Relations, Communications, and Culture and Values.

## Results

Table 1 (on page 8) indicates the demographic characteristics of the student respondents. The percentage values take the missing data into consideration.

Of those who completed the survey, 25 (64%) were Nursing students, 12 (31%) were GAS students, and 2 (5%)were unknown.

Thirty four of the respondents (87%) were women and five (13%) were men.

Thirty one out of the thirty nine (80%) respondents indicated that they were between the ages of 17-26 years, two (5%) indicated that they were between the ages of 27-36 years, four (10%) indicated that they were 37 years or older, while 2 (5%) had not indicated their age.

While the majority of the respondents (34 or 87%) were not disabled, 4 or 10% had either dyslexia (1), hydrocelphalus (1), spina bifida (1), or a visual impairment (1). One student (3%)

chose not to respond to the question.

TABLE 1

DEMOGRAPHIC CHARACTERISTICS OF THE STUDENT RESPONDENTS

| CHARACTERISTICS | NUMBER | % |
|---|---|---|
| PROGRAM | | |
| Nursing | 25 | 64 |
| General Arts & Science | 12 | 31 |
| Total | 37 | 95 |
| GENDER | | |
| Women | 34 | 87 |
| Men | 5 | 13 |
| Total | 39 | 100 |
| AGE | | |
| 16 years or under | 0 | 0 |
| 17 - 26 years | 31 | 80 |
| 27 - 36 years | 2 | 5 |
| 37 years or over | 4 | 10 |
| Total | 37 | 95 |
| PERSONAL DISABILITY | | |
| No | 34 | 87 |
| Yes | 4 | 10 |
| Total | 38 | 97 |
| FAMILY MEMBER WITH DISABILITY | | |
| No | 31 | 80 |
| Yes | 6 | 15 |
| Total | 37 | 95 |

TOTAL N = 39

Thirty one of the respondents (80%) indicated that none of their family members were disabled while six respondents (15%) indicated that they had family members who were disabled. Two students (5%) chose not to respond to the question.

A perusal of Table 2 indicates the majority of the students (36/39 - 92%) found neither the presence of the InstaCap typist or the TV monitor to be a distraction to them in the lecture hall. Three of the students (8%) found the TV monitor to be somewhat of a distraction in the smaller classroom setting.

TABLE 2

WAS THE PRESENCE OF THE INSTACAP TYPIST OR TV MONITOR A DISTRACTION TO ME IN THE LECTURE HALL OR SMALLER CLASSROOM?

| SETTING | STRONGLY AGREE | | TEND TO AGREE | | NEITHER AGREE OR DISAGREE | | TEND TO DISAGREE | | STRONGLY DISAGREE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Typist in Lecture Hall | 0 | 0 | 0 | 0 | 3 | 8 | 7 | 18 | 29 | 74 |
| Typist in Smaller Classroom* | 0 | 0 | 0 | 0 | 9 | 23 | 9 | 23 | 11 | 28 |
| TV monitor in Lecture Hall | 0 | 0 | 0 | 0 | 3 | 8 | 7 | 18 | 29 | 74 |
| TV monitor in Smaller Classroom* | 0 | 0 | 3 | 8 | 9 | 23 | 9 | 23 | 8 | 21 |

TOTAL N = 39

* - The Nursing students were not in the smaller classroom setting with the InstaCap system, thereby resulting in a higher number of nonrespondents to these two questions.

The faculty varied in their opinions as to whether or not they found the presence of the InstaCap system to be a

distraction in their classroom. One member found that during the seminar classes, the natural delay that occurs between the dialogue, the input by the typist, and the appearance on the TV monitor was a distraction as the student had to wait before he could respond. However, during lecture classes, this delay did not cause a distraction. Another faculty member found it to be a distraction due to the class scheduling. The classes were scheduled quite tightly (10 minutes between classes) and if the typist and the student arrived late, the interruptions were a distraction. There were not any problems when they arrived before the class started. The other faculty members found the presence of the InstaCap system not to be of a distraction as they were used to having technical machines and activity in the classroom.

Table 3 shows that 27 students (69%) agree the presence of the InstaCap system had a positive influence on the deaf student. Fifteen of them (38%) agree the system had a positive influence on the other students in the class.

The deaf student said InstaCap helped him in his academic pursuits. On a scale of 1 to 5 with 5 being the most satisfactory, he rated the usefulness of InstaCap to him as 5 out of 5. He became aware of what was going on in the classroom. It contributed to his sense of worth and pride at the college. Though the system was useful ("a real mindblower"), there were aspects that were not useful. The student said he and others expected too much all at once. He also said it limited his social activity in that he noticed that people shied away from

him and the machine and the other students thought that "he was with the typist". He did not have a chance to talk to the other students because he was busy taking the T.V. monitor from class to class. Another drawback to the equipment, was that it did not allow him to talk to the typist while the class was in progress. He could not ask her for an interpretation of the notes at the time and it took him a while to get used to the way the notes were given.

TABLE 3

HAS THE INSTACAP SYSTEM HAD A POSITIVE OR NEGATIVE INFLUENCE ON THE DEAF STUDENT AND ON THE OTHER STUDENTS IN THE CLASS?

| INFLUENCE | STRONGLY AGREE | | TEND TO AGREE | | NEITHER AGREE OR DISAGREE | | TEND TO DISAGREE | | STRONGLY DISAGREE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % |
| Positive on deaf student | 13 | 33 | 14 | 36 | 8 | 21 | 0 | 0 | 3 | 8 |
| Positive on other students | 5 | 13 | 10 | 26 | 18 | 46 | 3 | 8 | 2 | 5 |
| Negative on deaf student | 1 | 3 | 2 | 5 | 10 | 26 | 8 | 21 | 17 | 44 |
| Negative on other students | 1 | 3 | 3 | 8 | 16 | 41 | 9 | 23 | 9 | 23 |

TOTAL N = 39

The faculty also agree the InstaCap system had a positive influence on the deaf student and on the other students in the class. After the implementation of InstacCap, there was an improvement in the deaf student's attitude, his interest as to

what was happening, his motivation and learning experience, and his awareness. InstaCap meant the difference to passing or failing his courses. He had a responsibility to the typist who was being paid to assist his learning. He was able to develop a good positive relationship with one faculty member as he could no longer "play games". One faculty member, however, felt that the InstaCap system did not have a positive influence on this student. He found him to be so mesmorized by the machine that it took his total attention and though the student participated in the class, he completely disregarded where the other students were by his "see me" activity. The semester ended before he worked himself out of that. There was also the realization that InstaCap would not do everything for him and that it was not fair to expect it would.

The Regional Director of the Canadian Hearing Society mentioned the InstaCap system had a positive influence on the deaf student in that he had access to information in the classroom that he did not have previously.

The typist saw an improvement in his class participation and felt that the student could understand his subjects and had as much chance as any student with them. It gave him more confidence in his classes so that he would ask and answer questions.

Neither the Regional Director or the typist saw any negative influences of the InstaCap system on the deaf student.

In terms of the other students in class, the faculty felt the system had a positive influence on them. It let the students

understand what the deaf student was getting -- an abbreviated piece of the classroom experience that they were getting, it helped them to get caught up on information they missed and re-enforced their own learning, it provided them with an excellent model of good note-taking, it enabled them to treat the hearing impaired student as another student in the class who had the same material that they had, and it enhanced their awareness of the deaf student's learning difficulties and the handicapped in general. One faculty member felt that there were some negative influences on the other students. In the seminar class it hindered dialogue. The students also took undue advantage of the system by not taking their own notes and would watch the TV monitor rather than the teacher.

Table 4 shows the InstaCap system had a positive influence on the students' own awareness of the difficulties deaf students have in the classroom. Twenty seven of them (69%) agree it had a positive influence.

TABLE 4

INFLUENCE OF THE INSTACAP SYSTEM ON MY AWARENESS OF THE DIFFICULTIES THAT DEAF STUDENTS HAVE IN THE CLASSROOM

| INFLUENCE | STRONGLY AGREE | | TEND TO AGREE | | NEITHER AGREE OR DISAGREE | | TEND TO DISAGREE | | STRONGLY DISAGREE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % |
| Positive | 13 | 33 | 14 | 36 | 10 | 26 | 0 | 0 | 2 | 5 |
| Negative | 0 | 0 | 0 | 0 | 12 | 31 | 12 | 31 | 15 | 39 |

TOTAL N = 39

The faculty agree the presence of the InstaCap system (and the deaf student) had a positive influence on their own awareness of the difficulties that deaf/hearing impaired students have in the classroom. This positive influence improved their presentation in the classroom by: encouraging them to rephrase and clarify the major points and to use examples, providing them with a regular reminder of the auditory difficulties of some students, making them more sensitive to their problems, and making them more aware of the nature of the handicap.

The deaf student said he knew that one faculty member was happy with the system, but he did not know what the others thought.

A perusal of Table 5 (on page 15) shows the students agree they should have the opportunity to access the InstaCap system. Twenty four of them (62%) agree they should be able to access it through the reading of the T.V. monitor but only 19 of them (49%) would use the opportunity. Though 24 of the students (62%) agree copies of the printed notes should be available to other students in the class, 26 (67%) agree they would use the opportunity to obtain printed notes.

TABLE 5

OPPORTUNITIES TO ACCESS THE INFORMATION PROVIDED BY INSTACAP

| OPPORTUNITIES | STRONGLY AGREE | | TEND TO AGREE | | NEITHER AGREE OR DISAGREE | | TEND TO DISAGREE | | STRONGLY DISAGREE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % |
| Reading of TV monitor | 9 | 23 | 15 | 39 | 10 | 26 | 4 | 10 | 1 | 3 |
| I would read TV monitor | 7 | 18 | 12 | 31 | 12 | 32 | 6 | 15 | 2 | 5 |
| Copies of notes should be available | 14 | 36 | 10 | 26 | 8 | 21 | 5 | 13 | 2 | 5 |
| I would obtain copies of the notes | 15 | 39 | 11 | 28 | 5 | 13 | 3 | 8 | 5 | 13 |

TOTAL N = 39

With some reservation, the faculty agree other students in the class should have the opportunity to access the information provided by such systems as InstaCap. One faculty member felt that any aid which enhanced the possibilities for learning should be fully shared. Another indicated that this system allowed for both an auditory presentation as well as a visual one. However, others thought it would be allright only if the information was utilized at times such as illness or other times when a student has missed a class and if the instructor handed out the printed information so that students did not abuse the opportunity by using it as their only mode for obtaining information.

Table 6 (on page 16) shows the students agree that it is necessary to invest time and money into systems that assist not

only the disabled student in the classroom but other students as well.

TABLE 6

INVESTMENT OF TIME AND MONEY INTO TECHNOLOGICAL SYSTEMS THAT ASSIST STUDENTS IN THE CLASSROOM

| TECHNOLOGY IN THE CLASSROOM | STRONGLY AGREE | | TEND TO AGREE | | NEITHER AGREE OR DISAGREE | | TEND TO DISAGREE | | STRONGLY DISAGREE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | NO. | % | NO. | % | NO. | % |
| InstaCap should be used in classrooms | 22 | 56 | 12 | 31 | 1 | 3 | 1 | 3 | 2 | 5 |
| Invest in systems that assist disabled students in classrooms | 26 | 67 | 11 | 28 | 0 | 0 | 1 | 3 | 1 | 3 |
| Invest in systems that assist all students in classrooms | 13 | 33 | 18 | 46 | 7 | 18 | 1 | 3 | 0 | 0 |

TOTAL N = 39

Thirty four students (87%) support the notion that systems such as InstaCap should be used in college classrooms. Thirty seven students (95%) agree that it is necessary to invest time and money into technological systems that assist disabled students in the classroom while 31 of them (79%) agree that it was necessary to assist all students. One student expressed the opinion, that while agreeing strongly with helping handicapped students by investing money and machines, it was an extravagant use of

taxpayer's money to invest so much (e.g. machine and typist) on just one student.

The typist indicated the students accepted the system in their classrooms, asked questions about it, and expressed an interest in it. She also mentioned that at first some students thought the system would give the deaf student more of an advantage than they got but they do not think so any more.

The faculty readily agree systems such as InstaCap should be used in the college classroom. As an institution for post secondary education, we have a social responsibility to those who come to us. If it can aid people with handicaps, facilitate their participation, and increase their learning then it should be used. It benefits the non disabled student by capturing what happened during the discussions, lectures, or questions.

The typist found the faculty to be helpful by telling her the information they wanted put in before the classes started. She said they were interested in it and they thought it was a good idea and a big help to the deaf student.

The InstaCap system is seen as having strengths and weaknesses. Some of its strengths are that it:

* allows for visual re-enforcement of the spoken word which would greatly benefit the oral deaf;

* simplifies the spoken word;

* provides for different points of view and interpretation of the spoken word;

* provides an opportunity for students who otherwise would be denied an education;

* increases the awareness of others to the needs and wants of hearing impaired students;

* provides human contact (through the typist) in a technological setting (notion of high touch and high tech);

* provides a permanent record of the lectures;

* enables the deaf student to participate in discussions and the informal comraderie of the class and not just the formal presentations;

* provides the deaf student with a sense of self worth and pride;

* provides the services of a very good and helpful typist;

* fills the gap for the student who does not have access to an interpreter or can not use an interpreter;

* displays the information in English which sign language does not; and

* has the potential to benefit more students at a more sophisticated level of usage.

Some of the weaknesses associated with the InstaCap system are viewed as the following:

* the cumbersome nature of the equipment makes it disruptive at times and difficult to manoeuvre in small classrooms and through the doors;

* the time delay from the spoken word until the notes appears on the monitor;

* it of necessity requires the student to focus on the screen rather than on other students;

* the question of the affective domain is not addressed - it fails to capture the human spontaniety and emotional aspects of lectures or discussions;

* it is considered at times to be more like a toy;

* though it helps the deaf student, he could became too dependent on it if he stops taking notes and relies only on what is typed;

* whatever is entered is the result of the interpretation of the typist;

* the communication between the student and the typist is only one way;

* a level of English language understanding is required for such a system which makes it inappropiate for some deaf persons to use; and

* interference distorts the signal, at times.

In order to "improve the service of the system", some suggested changes include:

* the establishment of more intensified training for both the typist and the student before its use in the classroom;

* the establishment of learning contracts for the student, the teacher, the typist, and the other students in the class;

* the establishment of a formative evaluation plan in conjunction with the learning contracts;

* the availability of machines on each floor so that they would not have to be transported from floor to floor;

* making it more compact;

* the choice by the typist of obtaining credit for the courses in which the notes are entered;

* the establishment of guidelines as to how the system would be used by other students; and

* the establishment of rules for attendance and punctuality for the student;

* having more co-operation between the teachers and the typist as to material that could be pre-programmed (development of macros) before the classes; and

* ensuring that a co-ordinator for disabled students is available to "smooth" the way for the use of technical devices in the classrooms.

## SUMMARY

Developments in computer and software technology make it possible for deaf/hearing impaired students to participate more fully in the educational environment. The purpose of this study was to investigate the feasibility of using a portable captioning system (InstaCap) by a deaf student in the college environment. It was found to be a benefical technological tool to advance the teaching and learning of deaf students.

For the most part, the General Arts & Science and Nursing classmates of the deaf student and the faculty find neither the presence of the InstaCap typist or the T.V. monitor to be a distraction to them in the lecture hall or the smaller classrooms. They find the system to have a positive influence on the deaf student, on the other students in the classroom, and on

their own awareness of the difficulties that deaf students encounter in the classroom. They agree that accessibility to the system by reading the notes off the T.V. monitor and/or obtaining copies of the printed notes should be available, though not all would do so. They think it is necessary to invest time and money for the development of systems such as InstaCap.

The deaf student sees InstaCap as having a positive benefit on his academic pursuits by enabling him to be aware and understand what is said in the classroom and contributing to his sense of self worth and pride.

The Regional Director of the Canadian Hearing Society (Peterborough) feels the InstaCap system not only benefits the deaf student but is of benefit particularily to the oral deaf who can see and hear the information simultaneously.

According to the typist, improvements in the deaf student's class participation result as he gains more confidence and asks and answers questions. The other students express an interest in InstaCap by asking her questions about it and accepting it in their classroom. She finds the faculty helpful in that they tell her things that they want to be entered before the class starts.

The major strengths of the InstaCap system are that: it enables the deaf student to participate in the discussions and informal comraderie of the class as well as the formal lectures, it displays the information in English, it provides visual re-enforcement of the spoken word, and it enables a permanent copy of the notes to be printed.

The major weaknesses of this system are: that though portable it is still cumbersome, that what is entered as notes is the interpretation of the typist, the time delay that occurs between the spoken word and the transmission on the monitor, and it is not able to denote the emotional aspects or the "human element" of the lectures.

Some recommendations to improve the delivery of service include: have a more intensive training program for the typist and the student, make it more compact, have more information available to the typist for pre-entry, and have available a co-ordinator to liaison with faculty about technical devices such as InstaCap.

Since InstaCap proved to be a success in the college setting, it is obvious that a continued partnership of education and technology will continue to improve "the reach" of the disabled.

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